A REPORT

ON

POLLUTION

IN

THE GREAT LAKES

AND

INVESTIGATIONS PLANNED

BY

ONTARIO WATER RESOURCES COMMISSION

APRIL 1966

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INTRODUCTION

In 1965 the Ontario Water Resources Commission commenced studies on Lake Erie in keeping with the latest reference from the International Joint Commission to the Governments of Canada and the United States. The directive from the IJC dated October 1964 reads as follows:

> "to investigate and report upon the extent, causes, locations and effects of pollution in the waters of Lake Erie, Lake Ontario and the International Section of the St. Lawrence River, and to recommend the most practicable remedial measures which might be considered necessary in combating the existing problem".

The investigation programs to be carried out under the reference, including report preparation by 1969, will be done in conjunction with the Department of National Health and Welfare and the Department of Mines and Technical Surveys of the Government of Canada.

In previous years regular studies were carried out on the Great Lakes interconnecting channels and in early 1965 a detailed investigation was commenced on the St. Clair River. The purpose of this study which was undertaken in co-operation with the St. Clair River Research Committee was to determine the waste loadings introduced to the St. Clair River from the industrial complex at Sarnia and the effects of these discharges on the river.

Surveys were also made of the St. Marys, Detroit, the Niagara and St. Lawrence rivers. Shoreline studies in Lake Ontario from Hamilton to Metropolitan Toronto and east to Kingston along the St. Lawrence River to the Quebec boundary have been conducted in the past few years.

In this report, the developments in municipal sewage and industrial waste treatment are reviewed. Information has also been presented on the general quality of streams flowing into the Great Lakes and interconnecting channels.

The report contains eight appendices which represent the substance of material presented recently to the IJC. The last of these deals with the current Great Lakes surveys programs of the Ontario Water Resources Commission.

SUMMARY

The Ontario Water Resources Commission commenced studies in Lake Erie in 1965 following a new reference from the IJC. The investigations are being extended to include Lake Ontario in 1966. Surveys on the interconnecting channels which have been conducted in the past will be continued. A report on the studies is to be completed by 1969.

Municipalities and industries have been active in pollution abatement programs. The construction and employment of new treatment works has reduced stream pollution, however, careful evaluation of waste treatment needs will be required to ensure optimum protection of the streams and lakes in the Ontario section of the Great Lakes Drainage Basin.

The Don, Humber, Credit, Grand and Thames rivers are examples where overall improvements in water quality have resulted.

The enrichment of waters with nutrients has become a persistent problem even with application of known methods of abatement. Needed research is being carried out to develop satisfactory methods for combatting the nutrient problem.

OUTLINE OF THE STATUS OF

MUNICIPAL SEWAGE TREATMENT

In the Province of Ontario municipal sewage treatment has progressed favourably during the past ten years. The following examples indicate the progress that has been made in pollution control in several of the larger centres.

LAKE SUPERIOR - ST. MARYS RIVER

Primary sewage treatment plants now serve the cities of Fort William, Port Arthur and Sault Ste Marie.

ST. CLAIR RIVER - DETROIT RIVER

The City of Sarnia on the St. Clair River employs a primary sewage treatment plant. At Windsor, sewer construction is underway and preliminary plans for a sewage treatment plant have been received by the Commission.

LAKE ERIE - NIAGARA RIVER

A primary sewage treatment plant has been constructed and placed into operation at the City of Niagara Falls. The City of Welland has a primary plant under construction.

LAKE ONTARIO - ST. LAWRENCE RIVER

Sewage treatment facilities are being developed by the City of St. Catherines where a primary sewage treatment plant is under construction. Primary treatment plants are in operation at the cities of Hamilton and Kingston. Metropolitan Toronto has provided secondary treatment facilities. An extensive sewer construction program is nearing completion at Cornwall and a sewage treatment plant to be developed as a provincial project has been approved.

In Appendix I, a brief on municipal pollution abatement programs in municipalities bordering lakes Huron, Erie, Ontario and the connecting river systems is provided.

OUTLINE OF THE STATUS OF

INDUSTRIAL WASTE CONTROL

In a report made recently to the Technical Advisory Boards of the International Joint Commission a review of the status of industrial pollution contributed by industries bordering directly on lakes Erie, Ontario and the interconnecting channels was presented. This material is contained in Appendix II.

Some of the highlights of progress being made by industry are cited below.

ST. MARYS RIVER

The steel, pulp and paper and chemical industries at Sault Ste. Marie have been advised to continue with effluent improvement programs. The immediate objective of these programs will be to control oils, solids and other chemical wastes presently being discharged to the St. Marys River.

ST. CLAIR AND DETROIT RIVERS

Wastes from the oil and chemical industries in the Sarnia area are discharged to the St. Clair River. Construction of a new plant by Canadian Industries Limited is almost completed.

Plans are proceeding to reduce the loss of chemicals to the river at several industries. Treatment programs are being revised to improve the handling of phenolic waste by deep well disposal and where plant expansion programs have been announced, efforts are proceeding to reduce water consumption and the waste loadings introduced to the river.

Similarly industries that have been major sources of pollution on the Detroit River at Windsor and Amherstburg are proceeding with plans for effluent improvement.

LAKE ERIE

Industries at Port Maitland on Lake Erie have proceeded with waste recovery systems and further controls are being sought to improve the quality of the effluents from these companies.

LAKE ONTARIO

The pulp and paper industries in the St. Catherines - Thorold area are working toward the provision of primary treatment by the year 1967.

The steel industries at Hamilton have presented proposals for the removal of phenols, cyanide ammonia and other contaminants.

INFORMATION ON THE GENERAL QUALITY OF RIVERS AND STREAMS FLOWING INTO THE GREAT LAKES AND INTERCONNECTING CHANNELS

Recognizing the need for better knowledge of water quality in the river basins contributing to the lakes, the Commission commenced a program of water quality monitoring in 1964. This program which entails the monthly collection of water samples at 240 key locations on tributary drainage basins provides essential information concerning the variations in quality that occur below points of major use. For the purpose of the International Joint Commission, Great Lakes investigations, sampling locations and frequency have been intensified.

Some of the streams where analytical data reveal improvements in water quality are the Don, Humber, Credit, Grand and Thames rivers.

Improvements in the Don and Humber rivers and associated tributaries flowing through the intensively developed areas of Metropolitan Toronto have been brought about by the enlargement of the Main sewage treatment plant situated at Ashbridges Bay and construction of the Humber sewage treatment plant at the mouth of the Humber River respectively. These extended and new facilities made it possible to remove a number of upstream plants from service in each basin.

The enlargement of water pollution control facilities at Orangeville, construction of a new plant at Georgetown and removal from service of the plant located at Port Credit have done much to improve water quality in the Credit River and its tributaries.

The construction of sewage treatment facilities at Brantford, Elmira, Galt, Guelph, Kitchener, New Hamburg, Preston and Waterloo has reduced the amount of polluting material being discharged to the Grand River and its tributaries consequently improving water quality.

The installation of treatment facilities at Chatham and Stratford and the continuing pollution abatement programs at London and Woodstock have done much to clean up the Thames River and its tributaries.

The provision of water pollution control facilities by municipalities and industries has considerably reduced the amount of polluting material being discharged to the lakes and rivers. These efforts must be aggressively pursued to keep pace with the pressures of municipal and commercial development. However, other aspects of the water pollution problem have become increasingly apparent in recent years.

Eutrophication (enrichment) of water with nutrient chemicals such as nitrogen and phosphorus has stimulated growths of aquatic plants in inland waters as well as the Great Lakes. These nutrients may be found in the treated and untreated discharges from municipalities, certain industrial effluents and land drainage.

Research is being carried out by the Commission and other organizationsto develop an acceptable control program to the nutrient problem.

APPENDIX I

A BRIEF

TO THE

INTERNATIONAL JOINT COMMISSION

ON

MUNICIPAL POLLUTION ABATEMENT PROGRAMS

BY

ONTARIO WATER RESOURCES COMMISSION

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TABLE 1

NIAGARA RIVER - WELLAND RIVER

MUNICIPAL POLLUTION ABATEMENT PROGRAMS.

NIAGARA RIVER

MUNICIPALITY	CAPACITY AND TREATMENT	STATUS
Town of Fort Erie	1.8 mgd Primary	Satisfactory.
City of Niagara Falls	10.0 mgd Primary	Satisfactory.

WELLAND RIVER

City of Welland	None	Sewers being installed. Construction of 8 mgd Secondary plant planned in stages. Primary plant under construction.
City of Port Colborne (Welland Ship Canal)	East side - 0.5 mgd Secondary. West side - 0.9 mgd Secondary.	East side plant may be abandoned in favour of a third plant.
Village of Chippawa	0.3 mgd Secondary	Satisfactory.

TABLE 2

ST. MARYS RIVER LAKE HURON
ST. CLAIR RIVER DETROIT RIVER

MUNICIPAL POLLUTION ABATEMENT PROGRAMS

ST. MARYS RIVER

MUNICIPALITY	CAPACITY AND TREATMENT	STATUS
City of Sault Ste. Marie	8.0 mgd Primary	Overloaded due to combined sewers. Engineering study of sewer separation has been made.

LAKE HURON

Town of Southampton	None	OWRC is negotiating for sewage works.
Town of Port Elgin	1 mgd Primary	OWRC approval for lagoon to treat the primary effluent granted. Construction planned in 1966.
Town of Kincardine	30 acre lagoon	Satisfactory
Town of Goderich	None	1.0 mgd Secondary treatment plant under construction.

ST. CLAIR RIVER

Village of Point Edward	0.57 mgd Primary	Satisfactory
City of Sarnia	8.0 mgd Primary	Satisfactory.
Township of Moore (P.V. of Corunna)	0.32 mgd Secondary	Underloaded.

MUNICIPALITY	CAPACITY AND TREATMENT	STATUS
Township of Moore		
Hamlet of Mooretown	None	-
Village of Courtright	None	Sewage treatment recommended.
Township of Sombra		
P.V. of Sombra	None	Enquiry re feasibility of sewage works has been made by the village.
P.V. of Port Lambton	None	-
Town of Wallaceburg	None	Staged program includes 1.25 mgd activated sludge plant. Plant construction planned in late 1966.
	LAKE ST. CLAIR	
Town of Tilbury	0.30 mgd lagoon	Adequate.
Township of Tilbury N.		
P.V. Of Stoney Point	None	-
Village of Belle River	None	Sewage works recommended.
Village of St. Clair Beach	None	Sewage treatment recommended.
Town of Tecumseh	None	Negotiating for treatment at City of Windsor Little River sewage treatment plant.
	DETROIT RIVER	
City of Windsor	None	40.0mgd Primary plant planned. To be completed by 1967.
Little River Plant	4.0 mgd Secondary	New plant, underloaded.
Morris Subdivision	0.2 mgd Secondary	Overloaded.
Economy "	0.25 mgd Secondary	Overloaded
Industrial "	0.24 mgd lagoon	Extension considered.

TABLE 3

LAKE ERIE - LAKE ONTARIO - ST. LAWRENCE RIVER

MUNICIPAL POLLUTION ABATEMENT PROGRAMS

LAKE ERIE

MUNICIPALITY	CAPACITY AND TREATMENT	STATUS
Town of Amherstburg Townships of Anderdon and Malden	None	1.0 mgd primary plant to serve the town and two townships approved. Tenders called. Start of construction scheduled in 1966.
Town of Leamington	2.0 mgd Primary	Operated at design flow. No plans for expansion.
Town of Harrow	None	-
Town of Kingsville	None	Lagoon system approved. Awaiting OMB approval.
Township of Colchester South (Hamlet of Colchester)	None	-
Village of Wheatley	None	Sewage treatment recommended.
Township of Raleigh (Ontario Hospital)	0.5 mgd Secondary	Underloaded.
Village of Erie Beach	None	-
Village of Port Stanley	None	Provincial Scheme requested.
Village of Port Burwell	None	-
Village of Port Rowan	None	Treatment recommended.

MUNICIPALITY	CAPACITY AND TREATMENT	STATUS
Township of Charlotteville (Turkey Point)	None	-
Town of Port Dover	2.088 mgd Primary	Underloaded.
Town of Dunnville	None	1.7 mgd Secondary treatment facilities planned for 1966.
Village of Crystal Beach	0.3 mgd Secondary	Overloaded. Preliminary plans prepared for new facilities.
LAKE ONTARIO		
Town of Niagara on the Lake	34 acre lagoon	Satisfactory
City of St Catharines	(a) 1.6 mgd Primary plant.	(a) Inadequate. To be enlarged by 1969.
	(b) 9.0 mgd Primary plant under construction.	(b) Secondary treatment recommended.
Town of Beamsville	0.5 mgd Secondary	Overloaded. Area study presently undertaken to present solution to waste treatment problem.
Town of Grimsby	0.375 mgd Secondary	Overloaded. Area study as indicated under Town of Beamsville.
Township of North Grimsby	(a) 5 acre lagoon.	(a) At capacity. A 5 acre cell is approved.
	(b).04 mgd Secondary	(b) At capacity. Township sewage works

Cont'd

MUNICIPALITY	CAPACITY AND TREATMENT	STATUS
Township of North Grimsby (cont'd)		needs are determined in Beamsville area study.
Town of Stoney Creek	0.18 mgd Secondary	Overloaded. Plant will be abandoned when waste discharges connected to City of Hamilton sewer system in fall 1966.
City of Hamilton	60 mgd Primary	Secondary facilities in planning stage.
Town of Dundas	1.25 mgd Secondary	Adequate. Expansion required in near future.
Village of Waterdown	0.3 mgd Secondary	Entire area of village not yet sewered. Plant adequate to serve entire village.
Town of Burlington:		
Skyway	3.125 mgd Secondary	At 70% of design. Will be expanded to 6.0 mgd as need arises.
Drury Lane	2.5 mgd Secondary	Satisfactory.
Elizabeth Gardens	0.75 mgd Secondary	Satisfactory.
Town of Oakville:		
Navy Plant	0.75 mgd Secondary	90% of design.
Trafalgar Plant	2.5 mgd Secondary	Underloaded.
Township of Toronto:		
Lakeview	5.0 mgd Secondary	Presently overloaded. Presently extended to 10.0 mgd.
Clarkson	1.0 mgd Secondary	Underloaded.
Erindale	0.45 mgd Secondary	Underloaded.
Dixie	0.4 mgd Secondary	Underloaded.
Malton	0.75 mgd Secondary	Underloaded.

MUNICIPALITY	CAPACITY AND TREATMENT	STATUS
Metropolitan Toronto:		
Long Branch	0.75 mgd Secondary	Eventually (1967) directed to Township of Toronto Lakeview plant.
Humber	50 mgd Secondary	Staged extension to 75 mgd planned for completion by 1971.
Main (Ashbridges Bay)	120 mgd Secondary	Staged extension to 180 mgd planned for completion by 1971.
Highland Creek	8 mgd Secondary	Extension to 16 mgd to be completed by 1967.
Township of Pickering Bay Road STP	1.25 mgd Secondary	At 75% capacity.
Village of Pickering	None	.25 mgd A.S. proposed.
Town of Ajax	1.25 mgd Secondary	Extension under consideration. Need for enforcement of industrial wastes bylaw.
Town of Whitby	1.25 mgd Secondary	During canning season hydraulically overloaded. Plant expansion proposed.
Whitby Ont. Hospital	0.4 mgd Secondary	Operating at 50% capacity. Effluent unsatisfactory.
City of Oshawa	8.5 mgd Secondary	Extension to 9.0 mgd capacity under construction.
Town of Bowmanville	1.5 mgd Secondary	Underloaded.
Township of Darlington - O.T.S.	0.05 mgd Secondary	Effluent unsatisfactory.
Town of Port Hope	1.0 mgd Secondary	Satisfactory - infiltration problem.
Town of Cobourg	1.5 mgd Secondary	Overloaded. Extension to be undertaken as provincial project.

MUNICIPALITY	CAPACITY AND TREATMENT	STATUS
Village of Colborne	0.08 mgd lagoon	Underloaded. Just commenced operation.
Village of Brighton	0.136 mgd lagoon	Underloaded. Just commenced operation.
Town of Trenton	1.0 mgd Primary	Operating at 50% capacity.
R.C.A.F. Trenton	0.75 mgd Secondary	Overloaded - infiltration problem. Consultant study of problem underway.
City of Belleville	3.0 mgd Primary	Hydraulically overloaded. Provincial scheme requested.
Township of Hallowell - Picton Army Camp	0.140 mgd Secondary	Intermittent infiltration problem.
Town of Picton	0.540 mgd Secondary	New plant. Flows in excess of capacity.
Town of Napanee	0.750 mgd Primary	Satisfactory.
Township of Ernestown Amherstview	0.075 mgd lagoon	Underloaded.
Township of Ernestown (C.I.L. Millhaven)	0.04 mgd Secondary	Satisfactory.
City of Kingston	9.0 mgd Primary	Major part of sewer system is combined resulting in periodical hydraulical overloading.
Township of Kingston	0.83 mgd Secondary	This plant is adequate to serve the urbanized area of the township.

ST. LAWRENCE RIVER

MUNICIPALITY	CAPACITY AND TREATMENT	STATUS
Town of Gananoque	0.700 mgd lagoon	The facilities are adequate for some time into the future.
Township of Front of Yonge (Mallorytown landing Park)	0.014 mgd Secondary	The plant capacity is adequate.
City of Brockville	3.75 mgd Primary	Satisfactory.
Township of Augusta (Brockville Chemicals)	0.006 mgd Secondary	Satisfactory.
(Dupont Maitland)	0.0165 mgd Septic Tank	Overloaded. Plant extensions and modifications are planned.
Town of Prescott	None	A consulting engineers report has been prepared.
Village of Cardinal	0.08 mgd Septic Tank	Additional treatment capacity required.
Village of Iroquois	0.45 mgd Primary	Present daily flow .2 mg. Periodically problems with industrial wastes are encountered. This is being studied by a consulting engineer.
Village of Morrisburg	0.5 mgd Primary	Satisfactory.
Township of Williamsburg (Seaway Chemicals)	0.003 mgd Secondary	Satisfactory.
Township of Osnabruck - Ingleside	0.3 mgd Primary	Present flow 0.2 mgd.
Township of Cornwall-Long Sault	0.3 mgd Secondary	Present flow 0.2 mgd.
City of Cornwall	None	7 mgd sewage treatment plant approved as provincial project.

MUNICIPALITY	CAPACITY AND TREATMENT	STATUS
Township of Charlottenburg (St Lawrence Sanatorium)	0.005 mgd Septic Tank and under-drained tile bed.	Capacity adequate.

APPENDIX II

REPORT

TO THE

INTERNATIONAL JOINT COMMISSION

ON

INDUSTRIAL POLLUTION ABATEMENT PROGRAMS

BY

ONTARIO WATER RESOURCES COMMISSION

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Report to

IJC Advisory Board on Control of Pollution
of Boundary Waters

Lakes Superior-Huron-Erie Section February 1966

Sault Ste. Marie - St. Marys River

Algoma Steel Corporation

The waste characteristics are generally the same as the previous year. The new Cold Mill is now in operation, but the wastes from this mill are not of particular concern.

Abitibi Power and Paper Company

No change.

Domtar-Tar and Chemicals Division

This industry plans to divert its waste to the municipal sewer system. The timing of this depends on the planned diversions of West Davignon Creek.

St. Clair River

In June, 1965 extensive survey work was carried out in the Sarnia area on the St. Clair River. Although the report on this survey has not been completed, the technical data collected will form the basis of the information provided on the industries with direct discharges to the St. Clair River.

Muellers Limited

Muellers Limited is involved in the manufacture of plumbing fixtures. Industrial processes using water include electroplating and tumbling. It is hoped that disposal to the municipal sewerage system will eliminate disposal problems in the future.

Imperial Oil Enterprises Limited

Imperial Oil Enterprises Limited processes approximately 90,000 barrels of crude oil per day to produce a wide range of petroleum products. The new mercaptan plant and poly-vinyl chloride plant are not operating but the new acrylonitrile plant commenced operation in December, 1965. Cyanide wastes from the acrylonitrile plant are to be incinerated. The OWRC concurs with methods proposed for disposing of wastes from the PVC and mercaptan plant.

Sewer	Flow mgd	S. S. ppm	S. S. lbs/day	Phenol ppb	Phenol lbs/day	Ether Solubles ppm	Ether Solubles lbs/day
#3 Separator North	14.9	4	600	14	2.1	0	0
#5 Separator *	3.95	30	1,200	300	12.	153.	6,040
#9 & 10 Separators	14.0	6	80.	80	11.	1.3	180
#11 & 12 Separators	11.0	40	4,400	200	22.	10	1,100
Pressure Sewer	1.4	11	150	400	6.	10	140
Total	35.25		6,400		53		7,500

* Boats pumping ballast to Separator creating unusual turbulence.

Polymer Corporation

Polymer Corporation produces about 400 million pounds of rubber each year from light refinery hydrocarbons, acrylonitrile, acetonitrile and isoprene. The company is currently planning measures to reduce losses of rubber and phenolic material.

Sewer	Flow mgd	S. S. ppm	S. S. lbs/day	Phenol ppb	Phenol lbs/day	Ether Solubles ppm	Ether Solubles lbs/day
66" Sewer	67.5	30	20,200	200	135.	5.0	3,375
54" Sewer	36.5	19	6,900	120	44.	0.9	330
Copoly ditch	24.0	4	960	32	8.	0.8	190
Taktene Sewer	0.08	5	4	160	0.1	0	
Fly Ash Overflow	.048	5176	2,480	-		-	
Total	128		30,500		190		3,900

Fiberglas Canada Limited

Fiberglas Canada Limited produces fiberglas insulating materials. Water is used in the process for cooling, resin production and gas scrubbing. Efforts have been made to destroy phenolic material by chlorine dioxide oxidation. Although a satisfactory treatment method has not been established, work is continuing in this area.

Sewer	Flow mgd	S. S. ppm	S. S. lbs/day	Phenol ppb	Phenol lbs/day
Combined Plant Outfall	0.86	18	160	2,000	17.2

Cabot Carbon of Canada Limited

Cabot Carbon produces pelletized carbon black from heavy aromatic residual oils

Sewer	Flow mgd	S. S. ppm	S. S. lbs/day	Phenol ppb	Phenol lbs/day	Ether Solubles ppm	Ether Solubles lbs/day
Combined Plant Outfall	0.12	31	37.	24	0.03	1.5	1.8

Dow Chemical Canada Limited

Dow Chemical is a large chemical plant producing caustic soda, chlorine, ammonia, ethanolamines, ethylene glycols, polystyrene plastic and foam, latex polyethylene and ethylene chloride.

Sewer	Flow	S. S.		Phenols		Chlorides	
	mgd	ppm	lbs/day	ppb	lbs/day	ppm	lbs/day
1st Street Sluice	0.5	172	860	60	0.3	1950	9,750
Chlorine Caustic	2.9	96	2780	36	1.04	1050	30,400
42" Concrete	26.7	75	20,000	24	6.4	4540	1,212,000
1st Street Tile	2.5	221	3500	30	0.75	6240	156,000
2nd Street	6.1	4	240	20	1.2	123	7,500
3rd Street	41.6	12	4990	60	25.	262	109,000
Steam Plant Small	0.1	5	5	16	.016	11,100	11,100
Steam Plant Lge.	1.4	62	870	16	.2	99	1,900
Total	81.8		33,000		35.		1,500,000

Sun Oil Company, Limited

Sun Oil Company, Limited operates a refinery, in the southern limits of the city of Sarnia, which processes approximately 25,000 barrels of crude oil to produce gasoline, fuel oils, bunker oil and light hydrocarbons. The company is presently in the process of changing from bio-treatment of phenolic wastes to deep well disposal.

	Flow	S. S.		Phenols		Ether Solubles*	
	mgd	ppm	lbs/day	ppb	lbs/day	ppm	lbs/day
Combined Plant Outfall	11.3	13	1500	120	14	7.6	860

*Based on 6-month average of monthly waste analysis submitted by company.

Shell Oil Canada Limited

Shell Oil, Corunna, processes about 40,000 barrels of crude oil daily to produce a wide range of petroleum products. The company is presently arranging to dispose of 60,000 gallons per day of phenolic wastes to a deep well. These wastes are now being discharged to the St. Clair River.

Sewer	Flow	S. S.		Phenols		Ether Solubles	
	mgd	ppm	lbs/day	ppb	lbs/day	ppm	lbs/day
Oily Water	8.7	8	696	400	35	14	1220
Clean Water	31.9	7	2233	-	-	-	-
Total	40.6		2900		35		1200

Ethyl Corporation

Ethyl Corporation operates a plant on the St. Clair River to produce gasoline additives. Phenolic wastes resulting from the operations are disposed of in a deep well by a local contractor.

Sewer	Flow mgd	S. S. ppm	S. S. lbs/day	Lead ppm	Lead lbs/day
Combined Plant Outfall	2.5	9	225	1.8	45

Du Pont of Canada Limited

Du Pont operates a plant in Corunna for the production of pelletized polyethylene. Disposal of liquid wastes at this company has not been considered a problem.

Sewer	Flow mgd	S. S. ppm	S. S. lbs/day	Phenols ppb	Phenols lbs/day	Ether Solubles ppm	Ether Solubles lbs/day
Combined Plant Outfall	3.5	8	280	25	0.8	1.0	35

Allied Chemical Limited

Allied Chemical Limited, Corunna, produces Toluene di-isocyanate and by-product hydrochloric acid. Over 90% of water used is for cooling purposes.

Sewer	Flow mgd	S.S. ppm	S.S. lbs/day	Phenols ppb	Phenols lbs/day
Combined Plant Outfall	2.9	3.0	87	50	1.4

Canadian Industries Limited - Sombra Township

CIL is presently constructing a large plant in Sombra Township on the St. Clair River for the production of fertilizer. The plant is scheduled to commence operation in the spring of 1966. About 100 mgpd (U.S.) water will be pumped from the St. Clair River for use in the process. The majority of this will be for cooling. The company is presently dealing with the OWRC to arrive at satisfactory methods of disposal of process wastes.

Detroit River

Windsor Area - The data supplied in the summary dated August 1965 is the most current available for industries in the Windsor area including Chrysler Corporation of Canada Limited, Ford Motor Company of Canada Limited and Hiram Walker & Sons Limited.

Calverts Distillers Limited, Amherstburg

No change

Allied Chemical Ltd. - Soda Ash Plant

Allied Chemical Ltd., Amherstburg, formerly called Brunner Mond, operates a plant to produce 860 tons per day soda ash by the Solvay process. A recent survey shows that although several modifications were made to waste treatment facilities a deterioration of waste quality has occurred since 1962. The company has recently been asked to submit a brief to the Commission outlining problems, corrective measures taken, and proposed action to improve waste quality.

Sewer	Flow mgd	S. S. ppm	S. S. lbs/day
Main Plant Sewer	25	3000	750,000
Quarry Water & Lagoon Effluent	0.36	375	1,340
Total	25.4		751,340

Allied Chemical Ltd. - Genetron Plant

Allied Chemical Limited constructed a Genetron plant in Amherstburg for the production of fluorinated hydrocarbons for use as propellants. Water use will be about 1,3 mgd and will be used primarily for cooling. Arrangements are presently being made to treat 12,000 lbs per day of dilute waste caustic. Operation of the plant commenced November 1965 but the quality of the effluent has not yet been established.

Report to

IJC Advisory Boards on Control of Pollution
of Boundary Waters

Lakes Erie-Ontario Section
(Niagara River)

The industries reported below are those at which changes and improvements have been made since the last report to the Boards. Their discharges were to either tributaries of the Niagara River or in Lake Erie just above entrance to Niagara River.

Fort Erie

Gould National Batteries

This company produces a variety of lead storage batteries. Wastes are from floor washing and a water spray used to remove acid fumes from the charging room.

This company is considering plans for a waste treatment unit prior to submitting them to the OWRC for approval.

Niagara Falls

Bissell Limited

This company produces carpet sweepers and formulated rug shampoos. Industrial wastes originate in cooling spot welders, a polyethylene extruder and a polystyrene injection moulding machine. Rinse water results from the plating of chromium and nickel, as well as from a cleaning-painting line.

Previously, the wastes from this firm reached the Welland River untreated but are now discharged to the municipal sanitary sewer for treatment.

Lubrizol Canada Limited

At this company, sulphonation of alkyl benzene is the main process. Plant wastes are boiler blow down, heating condensates, overflow from the recirculating cooling water system, process water and wastes from the daily washing of a tank truck.

At the present time, the industrial wastes discharge to an oil separator and settling tank and then to a baffled and skimmed pond which discharges to the Hydro canal.

The company is negotiating with the municipality to direct its waste into the sanitary sewer.

Bertie Township

Wallace and Tiernan, Lucidol Division

This company produces organic peroxides. Acid and caustic wastes are discharged in batches.

The process wastes discharge to a ditch that flows south to Lake Erie just above the entrance to the Niagara River.

This industry is investigating methods of waste impoundment.

Report to
International Lake Erie Water Pollution Board

February 1966

Lake Erie

Electric Reduction Co. of Canada Limited - Port Maitland

This company began producing phosphoric acid and phosphate concentrates during the summer of 1961. The company uses the "wet process" for the manufacture of phosphoric acid. The basic raw materials are sulphuric acid and beneficiated phosphate rock.

The company also produces monocalcium and di-calcium phosphate from limestone and phosphoric acid.

This company has installed an acid recovery system and has made other improvements in waste handling which should reduce the quantity of fluorides and solids discharged.

Sherbrooke Metallurgical Company - Port Maitland

This company manufactures sulphuric acid from the roasting of zinc sulphide ores and the supplemental burning of sulphur.

This company has an acceptable effluent.

Report to

International Lake Ontario-St. Lawrence River
Water Pollution Board

February 1966

Du Pont of Canada Ltd. - Maitland Works

The Du Pont plant at Maitland manufactures such products as mylon intermediates, acrylic fibre, spandax fibre, freon and hydrogen peroxide. To produce the nylon intermediates, cyclohexane is oxidized in air and then with nitric acid to produce adipic acid. The adipic acid is then processed to produce either hexamethylendiamine or adiponitrile. Several wastes are associated with these reactions and these are discharged to the sewer. Acrylic is formed by the polymerization of acrylonitrile with methyl acrylate in the presence of a catalyst. The subsequent wash water is distilled to recover the monomer and then discharged to the sewer. Spandax fibre is produced by reacting isocyanate with glycol, with the resultant polymer being dissolved in a solvent. Excess solvent is washed from the fibre and later recovered by distillation with the wash water being discharged to the sewer. Freon is produced by reacting chlorinated hydrocarbons with hydrogen fluoride. Hydrochloric acid the by-product as well as the spent caustic refining solutions are discharged to the sewer. Peroxide is made in batch processes by reducing anthraquinone. The hydrogen peroxide is extracted with water and concentrated by distillation. The water from the distillation step is discharged to the sewer.

The highly contaminated process wastes are discharged untreated to the St. Lawrence River through a submerged 8-inch outfall. Cooling water along with the weaker wastes pass through three detention ponds and are discharged to the St. Lawrence River. The total volume of wastes discharged is approximately 35MGPD and the waste loadings are as follows:

	lbs/day
5-day BOD	62,200
COD	122,000
Ammonia Nitrogen	12,900
Kjeldahl Nitrogen	10,900

A tetraethyl lead plant has recently been constructed and started up on November 19, 1965. A sampling program will be required to determine the quantity and quality of the effluent originating from this operation.

C.I.L. Millhaven Fibre Ltd. - Kingston, Ont.

The C.I.L. plant in Kingston is engaged in the manufacture of terylene (Dacron), nylon fibre, and ammonia. To make terylene, dimethylterephthalate and glycol are reacted to produce the polymer. The staple fibre is dipped in a hot water bath having a continuous overflow to the sewer. In the nylon plant the polymer is melted and spun into a fibre. The only waste from this process is spent finishing oil. Ammonia is produced by reacting hydrogen and nitrogen

in the presence of a catalyst. To recover the heat, the oxidation gases are bubbled through water to produce steam. There is a continuous steam blowdown to the sewer to prevent a solids build-up. Waste scrubbing waters from the production ammonia are sprayed into a shallow pond.

The total waste discharge is in the neighbourhood of 17 mgd. The sanitary wastes are treated in a conventional primary and secondary treatment plant and are chlorinated prior to discharge. The wastes from the textile fibre division plant are directed to the North Channel of Lake Ontario at Amherst Island. Wastes from the ammonia plant are discharged to an open ditch which flows into the North Channel. Approximately 2.4% of the total industrial waste is contaminated. This waste originates at the textile plant and has a phenolic equivalent concentration of 40 ppb. In 1959, work was done to determine the effect of the plant waste on aquatic life. It was concluded that the plant effluent had little or no effect on the organisms living in the mud on the bottom of the channel.

The Aluminum Company of Canada Ltd. - Kingston

The Aluminum Company of Canada Ltd. maintains three plants in Kingston that are engaged in the production of aluminum sheet and foil from aluminum ingots and scraps.

In the south plant, scrap aluminum and ingots are melted and cast into slabs and round billets. After cooling the castings are washed with detergent with the wash water being discharged to the sanitary sewer. The foil is rolled in hot and cold running mills after which it is quenched in a weak sodium dichromate bath which overflows periodically to the sanitary sewer. The round billings are extruded through dies which are cleaned intermittently with a caustic solution that is discharged to the sanitary sewer.

The drop forge is located in the North Plant. The heated parts are quenched in a water tank which overflows continually to a storm sewer. Also located at the North Plant are the paint lines and anodizing operations. Wastes from these processes pass through a limestone bed prior to being discharged to an open ditch which flows directly to an open watercourse.

A cold rolling mill utilizing mineral oil in a recirculating system is located at the Centre Plant. The spills are collected in a sump which could be pumped to a ditch leading to Cataraqui Creek. The company is planning to build a dyke across the ditch to prevent the spills from reaching the watercourse.

The sanitary wastes along with the process wastes from the South Plant are discharged to the sanitary sewer while a major portion of the industrial wastes enter the Cataraqui Creek through the municipal storm sewer or the open ditch.

The waste loadings to the Creek as of the final report (1965) may be summarized as follows:

Flow gpd	BOD (lbs/day)	S. S. (lbs/day)	Ether Soluble (#/d)	Al (#/d)
280,000	305	298	83	75

A dyke has been completed to prevent the oil spillage from reaching the watercourse. The company is presently carrying out an intensive sampling program to pin-point the sources of pollution at the plant. A consultant has been hired to assist the company in solving the pollution problem.

Du Pont of Canada Ltd. - Kingston, Ont.

The Du Pont plant located in Kingston is engaged in the production of nylon thread only. Adipic acid and hexamethylenediamine are reacted in aqueous solution to form the nylon polymer. No excess of either component is lost since there is no sewering of unreacted materials. Nylon is decolourized by the use of activated charcoal. Small amounts are lost to the sewer with the wash water. Titanium dioxide is added to act as a delustrant. Some of this white material is lost to the sewer along with the wash water. Some dyeing of fibre is done at the plant with the spent batches being discharged to the sewer.

The plant discharges approximately 7.5 mgd of wastes to Cataraqui Bay containing varying amounts of oil, titanium dioxide, and phenol. To eliminate the oil pollution a check valve was installed to prevent future accidental oil spills. Also attempts are in progress to install a central collection system to catch the titanium dioxide. Sanitary wastes are treated in a septic tank and chlorinated prior to discharge to Cataraqui Bay. The present treatment facilities, however, seem to be overloaded and do not produce a satisfactory effluent.

The Canada Starch Company, Ltd. - Cardinal, Ont.

The production of starch from corn is based largely on a physical separation of starch from the gluten and fibre followed by washing and recovery of the product by drying. Sugars are produced by hydrolysis of starch and are recovered as syrups or crystals by conventional evaporation and thickening.

The plant operates a "bottled-up" process, whereby water is introduced at one point of the process, namely, at the final starch washing stage. The water is re-used as it works its way back up the system and ends in the steep water evaporators. There is very little appreciable liquid waste from this type of corn starch production.

Presently a wheat starch pilot plant is under investigation with studies being carried out to emphasize product recovery rather than waste treatment. The wheat gluten market will dictate whether the construction of a full-scale plant will be justified.

To reduce the amounts of contaminants discharged to the St. Lawrence River a number of significant changes in plant operation have been made in the past year. A triple effect evaporator has been installed to minimize the losses due to vapour entrainment. This unit will be on full stream in the early part of 1966. Also a new glucose and dextrose refinery has been started as well as a new starch washing and treating system. Both should reduce the amount of contaminants discharged to the watercourse.

The sanitary wastes along with the wastes from the oil refinery, deodorizing process, and dry starch department are discharged to the sanitary sewer. The remaining industrial wastes are discharged to the St. Lawrence River through two outfalls without the benefit of treatment.

According to the last report the waste loadings may be summarized as follows:

Flow (mgd)	BOD (lbs/day)	S. S. (lbs/day)
5.5	13,500	6,800

The company has presently hired a consulting engineering firm with the intention of constructing waste treatment facilities.

A Davis and Son Ltd. - Kingston

A. Davis and Son Company, Ltd. uses conventional chrome and tan processing to convert cow hides to leather used in boat and shoe uppers. Hair is removed from the salted hides by immersing them in a lime bath. After de-hairing the hides are passed through a fleshing machine for further cleaning. Prior to pickling in sulphuric acid the hides are treated in bate tanks containing a solution of proteolytic enzymes. After pickling the hides are tanned in a chromic sulphate solution after which the chrome is fixed with soda ash. As a finishing step, the hides are compressed, oiled, and a top dressing is applied.

Since most of the processes are batch operations, the effluent from a tannery varies greatly depending upon the solution dumped. Although the volume of water is not easily determined, it was estimated that this tannery discharges a total volume of 200,000 gallons per day. Wastes in this tannery come from three sources: the beamhouse, the bate and pickling yard, and finishing room. The typical wastes are tabulated below.

Characteristic	Source: Beamhouse Wastes	Source: Bate, Pickle & Tan Wastes	Source: Finishing Room Wastes
BOD ppm	1600	500	970
Suspended Solids ppm	1700	480	970
Ether Solubles "	500	180	230
Sulphides "	50		
Total Nitrogen "	180	150	170
pH "	10		7.9
Chromium		150	

Presently all the industrial wastes are discharged to the Cataraqui River without treatment. The company is planning flue gas treatment of the wastes to remove the sulphides along with conventinnal sedimentation to remove solids.

Lake Ontario

During the summer of 1965 detailed surveys were carried out at the major industries having direct discharges to Lake Ontario in this area.

Data collected during these surveys is summarized below for the respective industries.

Shell Canada Ltd. - Oakville

This company operates a 33,000 bbl/day oil refinery producing a variety of petroleum derivatives, primarily combustible fuels.

Waste water treatment facilities include oil separators, equalising basins, biological and chemical oxidation units. The final effluent from these facilities is discharged to Lake Ontario and has the following average characteristics:

Flow	BOD		S. S.		Phenols		Oil	
gpd	ppm	lbs/day	ppm	lbs/day	ppb	lbs/day	ppm	lbs/day
800,000	8	63	14	114	25	0.2	3	21

British Petroleum Co. Canada Limited - Oakville (Formerly Cities Service Canada Limited)

This refinery processes 25,000 bbls/day of crude petroleum to produce a variety of hydrocarbon fuels. Waste water treatment facilities include oil separation, equalising basins, biological and chemical oxidation equipment. The discharge to Lake Ontario from these facilities has the following average characteristics:

Flow	BOD		S. S.		Phenols		Oil	
gpd	ppm	lbs/day	ppm	lbs/day	ppb	lbs/day	ppm	lbs/day
400,000	2	8	1	4	10	0.04	0.5	2

British American Oil Co. Canada Ltd. - Clarkson

This refinery processes 60,000 bbls. crude petroleum per day producing a complete range of petroleum products. Waste water treatment facilities include oil separators and biological processing equipment. The final effluent has the following average characteristics.

Flow	BOD		S. S.		Phenols		Oil	
gpd	ppm	lbs/day	ppm	lbs/day	ppb	lbs/day	ppm	lbs/day
25,220,000	7.4	1869	20	5181	38	9.6	3	764

Regent Refining Co. Canada Ltd. - Port Credit

The Regent Refinery processes 35,000 bbls. crude oil per day to produce a range of petroleum products including petrochemical solvents. Waste water treatment facilities include oil separators and biological processing equipment. The final effluent to Lake Ontario has the following characteristics:

Flow	BOD		S. S.		Phenols		Oil	
gpd	ppm	lbs/day	ppm	lbs/day	ppb	lbs/day	ppm	lbs/day
27,600,000	4.7	1300	22	600	10	3	3.6	1000

St. Lawrence Starch Co., Ltd. - Port Credit

The company processes corn to produce a variety of starches, syrups and corn oil. Negotiations between the company and the OWRC are currently being conducted with a view to complete treatment by the industry or possibly as a joint industrial-municipal undertaking.

Present waste characteristics of the discharge to Lake Ontario are as follows:

Flow	BOD		S. S.	
gpd	ppm	lbs/day	ppm	lbs/day
1,100,000	3273	38,000	1273	14,000

St. Lawrence Cement Co., Ltd. - Clarkson

This company manufactures cement, and utilises a substantial volume (1.3 mgd) of cooling water in the process. Apart from temperature rise this is returned to Lake Ontario virtually uncontaminated.

Anaconda American Brass Co., Ltd. - New Toronto

This company manufactures copper and copper alloy rod, tube and strip. Waste waters from pickling operations are discharged to Lake Ontario and have the following average characteristics.

Flow	pH	Copper		Chromium		Zinc	
gpd		ppm	lbs/day	ppm	lbs/day	ppm	lbs/day
250,000	2	30	45	20	30	15	23

Current plans for waste treatment include facilities for the recovery of copper and the neutralization and removal of other metals.

Dominion Tar and Chemicals Ltd. - Toronto

This company operates a tar distillery in Toronto. Improvements in the cooling water system have resulted in a reduction in phenol losses and investigations are being continued. Current waste loadings are as follows:

Flow	S. S.		Oil		Phenols	
gpd(est.)	ppm	lbs/day	ppm	lbs/day	ppb	lbs/day
45,000	60	27	6	2.7	210	1

Gordon Young, Limited

This rendering plant has a five-stage grease separator following the cooking condensers. The discharge from this unit in conjunction with cooling water has the following characteristics:

Flow	BOD		S. S.		Oil	
gpd	ppm	lbs/day	ppm	lbs/day	ppm	lbs/day
60,000	18	11	140	84	30	18

Maple Leaf Mills Ltd. - Toronto

This plant discharges approximately 150 gpm cooling water to the Toronto Harbour with following characteristics:

BOD	Susp. Solids(ppm)	Oil(ppm)
2	6	Nil

Victory Soya Mills Ltd. - Toronto

This company's effluent to Toronto Harbour consists primarily of cooling water with some condenser overhead with the following characteristics:

Flow	BOD	Susp. Solids(ppm)	Oil(ppm)
gpd	ppm		
600,000	3	22	Nil

Continental Can Co., Ltd. - Toronto

The two Continental Can Co. plants discharge waste pulp water to the lake. In the Commissioner Street Mill a flat screen has been installed to recover coarse fibres from the pulp and a vacuum filter has also been installed on the paper machine. Similar equipment is being installed at the Polsen St. Mill. Negotiations between company and Metro Toronto officials with a view to discharging these wastes to the municipal sanitary dewers.

Waste Characteristics from the two mills are as follows:

	Flow gpd	S. S. ppm	S. S. lbs/day	BOD ppm	BOD lbs/day	Oil ppm	Oil lbs/day
Polson St.	250,000	300	750	160	400	110	275
Commissioner St.	250,000	370	925	130	325	5	13

R. L. Hearn Generating Station - Toronto

The major use of water at this plant is for cooling purposes and this is returned to the lake virtually uncontaminated, except for temperature rise, at the rate of 1,000,000 gallons per minute. Fly ash recovery is practiced at this station and the wash waters are settled and dewatered in two bins and the decant returned to the lake. This has been a source of previous complaints. Recent modifications appear to have solved this problem.

Municipal Incinerators - Wellington St. and Commissioner St., Toronto

Discharges from these two incinerators present a similar problem in fly ash disposal. Current plans call for the disposal of these high BOD and suspended solids wastes to municipal sanitary sewers.

APPENDIX III

A

SUMMARY REPORT

TO THE

INTERNATIONAL JOINT COMMISSION

ON A

WATER QUALITY STUDY

OF THE

NIAGARA RIVER

BY

ONTARIO WATER RESOURCES COMMISSION

1 9 6 5

INTRODUCTION

The survey conducted in 1965 under IJC Reference included collection of samples on November 4 and 5, on sampling range NI-37.7. This range extends across the river from downstream of the confluence of the Buffalo and Niagara Rivers and Buffalo Harbour in line with the City of Buffalo water works intake. The intake terminates 6500 feet from the American shore.

SAMPLING PROCEDURE

The records indicate that this range has not been sampled for detailed analyses since 1948-49. Whereas the samples collected then were obtained from near the surface of the water, the 1965 survey included collection of samples at approximately five feet from the surface and the bottom and near the centre at most of the sampling locations. In shallow water near the shores samples were collected near the surface and the bottom only.

Analyses were performed for bacteriological content, 5-day BOD, Turbidity, dissolved oxygen, temperature, chlorides, conductivity, phenols, free ammonia, total Kjeldahl, nitrite, nitrate and total and soluble phosphorus. In addition, samples were collected for biological determinations for which, however, the results are not yet available.

DISCUSSION OF RESULTS

In terms of coliform content and 5-day BOD the results indicate satisfactory water quality across the entire river, with maximum values of 100 coliforms per 100 ml and 1.0 to 2.0 ppm 5-day BOD. The turbidity values decrease gradually from approximately 30 Units near the American shore to 6 Units near the Canadian shore. The phenols decrease from approximately 8.0 ppb, 200 feet from the American shore, to 2.0 ppb, 1000 feet from the American shore. Values approximating the latter concentrations predominate at the sampling stations closer to the Canadian shore. The chloride content does not vary greatly from approximately 27 ppm at all of the sampling locations. Similarly, the conductivity values do not diviate significantly from 280 micromhos per cubic centimeter. With regard to the nitrogen and phosphorus data obtained, none of the values indicate any difference in concentrations in the samples collected between the two shores. The total Kjeldahl values approximate 0.30 ppm and soluble phosphorus values approximate 0.8 ppm.

This information will be used for comparative purposes with the data to be obtained during 1966.

APPENDIX IV

A

SUMMARY REPORT

TO THE

INTERNATIONAL JOINT COMMISSION

ON

WATER QUALITY STUDIES

IN

LAKE ERIE

BY

ONTARIO WATER RESOURCES COMMISSION

1 9 6 5

INTRODUCTION

The Ontario Water Resources Commission conducted an investigation of water quality in Lake Erie from August 3, to December 15, 1965. This examination was undertaken as a result of a Reference from the Governments of Canada and the United States to the International Joint Commission.

SAMPLING DETAILS

The surveys were confined mainly to the western basin of Lake Erie where 100 stations on 14 ranges were sampled. All but one range was established previously by the IJC. Sampling of the ranges varied from a minimum of two to a maximum of four times. One IJC range in the east end of the lake was sampled on two occasions. Seventeen stations established by the United States Department of Health, Education and Welfare for the Great Lakes - Illinois River Basins Project (GLIRBP) were sampled once. Samples were obtained at each location from various depths.

From the initial phenol and bacteriological determinations, the number of parameters were increased to include turbidity, conductivity, total and soluble phosphorus, free ammonia, nitrites and nitrates. The Membrane Filter (MF) technique was employed to obtain a direct enumeration of coliform organisms. In the western basin of Lake Erie the determination for total Kjeldahl was performed on a composite sample from each range. In the east part of the lake and along the north shore, the test for total Kjeldahl was carried out on individual samples. Sampling for biological characteristics was carried out at selected locations on the lake.

DISCUSSION OF RESULTS

The following general comments respecting the data can be made. A maximum coliform count of 5,500 organisms per 100 ml was found in Canadian waters at the mouth of the Detroit River. The highest coliform count was obtained in the vicinity of Leamington where the maximum value was 650,000 per 100 ml. Conductivity varied from a low of 156 to a high of 289 micromhos per cubic centimeter.

In United States waters, from the mouth of the Detroit River to the area downstream from Pointe Mouillee, high coliform counts were found. Values ranged from a minimum of 12 organisms to a high of 283,000 organisms per 100 ml. Minimum and maximum conductivity levels were 214 and 340 micromhos per cubic centimeter.

In the western basin of Lake Erie dissolved oxygen values ranged from a minimum percentage saturation of 35 to a maximum percentage saturation of 92. Water temperatures varied between 1.8°C and 25°C during the period under study.

COMMENTS

The bacteriological results of the 1965 survey indicated that the quality of the water in the western basin of Lake Erie remained as previously reported. However, the dissolved oxygen values were generally lower.

It is also noted that the conductivity values at the east end of Lake Erie were approximately 67 per cent higher than levels found at the outlet of Lake Huron.

APPENDIX V

A

SUMMARY REPORT

TO THE

INTERNATIONAL JOINT COMMISSION

ON THE

ST. MARYS RIVER, ST. CLAIR RIVER, DETROIT RIVER

BY

ONTARIO WATER RESOURCES COMMISSION

1 9 6 5

ST. MARYS RIVER SURVEY

INTRODUCTION

A water quality survey was conducted along this river on August 29, 1965 for IJC purposes.

SAMPLING PROCEDURE

Six IJC ranges, including SMD-0.8 to SMD-14.2e, were sampled from Sault Ste. Marie to the mouth of Lake George with an average of three stations per range. Tests for Membrane Filter coliform concentrations and nine chemical parameters were performed on the samples. The chemical parameters included; 5-day BOD, total solids, alkalinity, chlorides, pH, nitrates and phenols.

DISCUSSION OF RESULTS

A coliform concentration in excess of 2400 coliforms per 100 ml was found at only one range, SMD-2.0, at a distance of 3800 feet from the American shore. Upstream, at station SMD-0.8, 2500 feet from the American shore, the coliform concentration was found to be 1800 coliforms per 100 ml. The remaining results for coliform organisms were in the order of 100 to 400 coliforms per 100 ml. The 5-day BOD of all the samples were less than 1.5 ppm while the total solid results were less than 70 ppm. The alkalinity results were in the order of 45 ppm with the pH in the slightly alkaline range. The chloride results were within the range of two to three ppm. At range SMD-2.0, phenol concentrations of six ppb and ten ppb were found 2800 feet and 3800 feet, respectively, from the American shore. The phenol content at SMD-8.5e was six ppb near the American shore, but otherwise the concentrations of phenols were all less than four ppb.

COMMENTS

With the reservations that the concentration of coliforms and the phenol content were slightly in excess of current objectives at certain stations, the available information on the water quality of the river indicated satisfactory conditions.

ST. CLAIR RIVER SURVEY

INTRODUCTION

Three major surveys were conducted in 1965 along the St. Clair River, commencing with a survey in May-June. As a continuation of the May-June survey and also for the IJC reference, two additional surveys were carried out in the periods from August 25 to September 8, and from December 2 to December 22.

SAMPLING PROCEDURE

May-June Survey

Twenty ranges were sampled twice with 10 ranges being IJC and the remainder OWRC. Each range consisted of an average of four stations. At each station where the depth of water was 20 feet or more, samples were collected five feet from the surface, the centre, and five feet from the bottom. Only one sample was collected at the remaining stations. The sum of samples accumulated was 396 bacterial and 396 chemical, with 23 parameters performed on each chemical sample. A carbon adsorption filter was installed, just upstream of range SR-30.1e.

August-September Survey

All 15 ranges involved were IJC with an average of six stations per range from the Canadian to the U.S. shore. Each of these ranges was sampled from one to three times. Each sample for chemical analysis consisted of a composite of samples from the top, bottom, and centre at each station. Approximately 300 chemical and 300 bacteriological samples were analysed with 14 chemical analyses being performed on each sample.

December Survey

Thirteen ranges were sampled at least twice with six being IJC and the remainder OWRC. Top, bottom, and centre samples for bacteriological and chemical analyses were collected at each station. There was an average of seven stations, per range extending from the U.S. to the Canadian shore. Thirteen parameter determinations were performed on each chemical sample.

COMMENTS

Concentrations in excess of current objectives occurred along the Canadian shore for a distance of 300 to 500 feet. Further west, all the parameters decreased in concentration. The band of apparent excessive water quality impairment extended from Sarnia downstream to Sombra where the width of the band decreased to approximately 100 feet from the Canadian shore. Near the American side the occasional coliform concentration in excess of 2400 organisms per 100 ml was detected. At the most downstream range SR-2.8, the water quality was found to be comparable to that of the most upstream sampling range SR-39.0.

DETROIT RIVER SURVEY

INTRODUCTION

The 1965 water quality study of the Detroit River under IJC reference was commenced on August 10, and completed on December 22.

SAMPLING PROCEDURE

Twenty ranges were sampled, eighteen of which were IJC ranges. Of the twenty ranges, each was sampled an average of three to four times with one being sampled as many as seven times.

A total of 1719 chemical, 1719 bacteriological, and 51 biological samples were obtained during the course of the survey. The samples were collected five feet from the surface, at the middle, and five feet from the bottom at most of the stations. The analyses performed included; membrane filter coliform count, turbidity, conductivity, dissolved oxygen, temperature, phenol, free ammonia, total Kjeldahl, nitrite, nitrate, total and soluble phosphorous, and biological determinations.

DISCUSSION OF RESULTS

Reference is made only to the coliform, turbidity, and conductivity data.

A maximum of 130 coliforms per 100 ml was indicated at the base range DT-30.8w. The coliform concentration increased from this point to a maximum high of 2800 near the shores at range DT-25.7. On range DT-20.6 the coliform concentration reached a maximum of 91,000 coliforms per 100 ml three hundred feet from the American shore and a maximum of 9,000 coliforms per 100 ml near the Canadian shore. Further downstream at range DT-17.4w maxima of 116,000 and 3,000 coliforms per 100 ml were detected on the American and Canadian shores, respectively. At range DT-3.9 a maximum of 33,000 coliforms per 100 ml was indicated on the American side of the International Boundary and a maximum of 20,000 coliforms per 100 ml was indicated on the Canadian side.

The turbidity increased from a high of 12 Units at range DT-30.8w to a high of 25 Units at DT-19.0. Downstream from this range the turbidity decreased to a high of 18 Units at range DT-3.9.

The conductivity values increased from a high of 165 micromhos per cubic centimeter at range DT-30.8w to 250 at range DT-19.0. The conductivity then remained at approximately 190 to 240 micromhos per cubic centimeter along both shore lines until range DT-3.9 where the values increased to 300 to 400 near the American shore and 250 along the Canadian shore.

COMMENTS

In general all of the pollution parameters increased from the base range at DT-30.8w at the inlet to the Detroit river to its outlet at Lake Erie near range DT-3.9. The pollution was also noted to concentrate along both shore lines.

APPENDIX VI

REPORT

TO THE

INTERNATIONAL JOINT COMMISSION

ON

SPILLS OR OTHER UNUSUAL CONDITIONS

ON

LAKE ERIE, LAKE ONTARIO, ST. LAWRENCE RIVER

BY

ONTARIO WATER RESOURCES COMMISSION

1 9 6 5

LAKE ERIE

The vessel "Orient Merchant" grounded on a reef outside Port Colborne harbour on April 27, 1965 in dense fog. In the attempt to refloat the vessel, which was not completed until May 8, 1965, the salvage crew thought it necessary to force compressed air into the double bottom tanks. It is believed that in the process a mixture of water and oil was discharged into the lake. An oil spill was reported on or about May 7, 1965, which was believed to have originated from the Orient Merchant. Oily deposits, oil patches and accumulations of oil debris were found over a five mile stretch of beach in the vicinity of the grounded vessel. In the opinion of the OWRC and the Federal Department of Transport, there was insufficient evidence for prosecution and therefore, no further action was taken.

LAKE ONTARIO

On July 26th, 1965, a heavy film of oil was reported to be entering Lake Ontario via an open ditch originating from the Stone Oil Company Limited plant in Toronto. Company officials have been requested to construct an interceptor ditch to control future oil run-off conditions.

Oil pollution which was reported on August 6, 1965, at Burlington Beach was believed to have originated from industrial outlets in Hamilton Harbour.

On October 6, 1965, a liquid waste haulage firm reportedly discharged two tank-trucks, loads of waste oil into Hamilton bay near the foot of Strathearne Avenue, Hamilton. Evidence is being gathered by OWRC staff for possible prosecution.

Oil-coated water fowl were found on December 12, 1965, adjacent to Burlington, but the source of the oil could not be located.

ST. LAWRENCE RIVER

On October 22, 1965, a tank-truck loaded with carbolic acid (phenol) was involved in an accident approximately one mile west of the Ivy Lea Bridge on the MacDonald Cartier Highway. Fire trucks flushed the spilled acid into the river using, in the process, some 45,000 gallons of water. River samples taken in the immediate vicinity of the spillage on October 27 and 28, 1965, were negative, suggesting that the contaminated water had by then moved down river. Downstream water users were alerted, but serious taste problems were not encountered on the Canadian and United States sides.

Dead eels washed ashore downstream of Cornwall have been a continuous problem with respect to the Robert Saunders Generating Station of Cornwall. Although the problem appears to be gradually diminishing, investigations of methods to effectively control the problem would be desirable.

APPENDIX VII

REPORT

TO THE

INTERNATIONAL JOINT COMMISSION

ON

SPILLS OR OTHER UNUSUAL CONDITIONS

ON THE

ST. MARYS RIVER, LAKE HURON, ST. CLAIR RIVER,

DETROIT RIVER, NIAGARA RIVER.

BY

ONTARIO WATER RESOURCES COMMISSION

1 9 6 5

ST. MARYS RIVER

No spills or other unusual conditions were reported in the St. Marys River during 1965.

LAKE HURON

On May 3, 1965, an oily or greasy type material was washed ashore near Port McNicoll Harbour, Georgian Bay, three days after the ice reportedly broke, and the ships that wintered in the port left. The greasy deposits washed ashore were believed to have originated from one or more of the boats which berthed during the winter at Port McNicoll and/or Midland Harbours. The boats in question had departed before the investigation, and no action could be taken.

On November 18, 1965, traces of Bunker "C" oil were reported along the shore of Lake Huron from north of Goderich to south of Port Elgin. Ducks with their feathers oil-soaked were found dead or in a dying condition along the shore. The oil slicks could not be located during the investigation, and no further action could be taken.

ST. CLAIR RIVER

No spills or other unusual conditions were reported in the St. Clair River during 1965, with the exception of the occurrence as reported in the Aerial Reconnaisance Report being submitted under the date of February 8, 1966.

DETROIT RIVER

Two incidents of oil pollution were reported on the weekend of September 4, 1965. The firms responsible for the discharge were identified as Norfolk and Western Railway and the Great Lakes Steel Company. Since the incidents involved United States concerns and apparently occured in United States waters, the matter was placed into the hands of the Michigan Water Resources Commission for further investigation.

NIAGARA RIVER

A fish kill was reported during autumn and was found, following an investigation, to be an annual occurrence similar to previously reported incidents. Spills or other unusual conditions were otherwise not reported.

APPENDIX VIII

ONTARIO WATER RESOURCES COMMISSION

GREAT LAKES SURVEYS PROGRAMS

1 9 6 6

ONTARIO WATER RESOURCES COMMISSION

GREAT LAKES SURVEYS PROGRAMS

1 9 6 6

The Commission's programs on the Great Lakes have been broadened and extended to include qualitative studies in the immediate and near shore waters of the lakes and the interconnecting channels. For the purposes of the International Joint Commission pollution investigation, the program has been divided into two phases, namely: short term and long term studies.

The short term studies deal with the extent, origin and location of pollution and encompass the effects of wastewater discharges and natural tributary inputs on the quality of the lakes. In addition, information will also be obtained on the adequacy of present practices in land use in relation to water quality protection. The current IJC reference concerns lakes Erie and Ontario and the International Section of the St. Lawrence River.

The longer term continuing studies will be commenced concurrently with the short term work and will include investigations of lake circulation, mixing and diffusion, chemistry, physics and biology of the lakes, changes and relative significance of pollutants, water quality parameters, effectiveness of remedial measures, and potential dangers from fertilizers, pesticides and herbicides.

More intensive research will form part of the investigation programs of the IJC to increase knowledge and understanding of the physical, chemical and biological behaviour of the Great Lakes and the effects of pollutants, to develop more effective means of treatment of polluting sources, to determine the toxic levels of constituents under Great Lakes conditions and obtain a better understanding of the processes of eutrophication.

The Commission's program has been divided into six separate areas as follows:

(1) water use inventory;

(2) pollution sources evaluation;

(3) harbour and near shore areas;

(4) tributary streams;

(5) special and deep water projects;

(6) interconnecting channels (St. Marys, St. Clair-Detroit and Niagara rivers) investigations.

1. Water use Inventory

By suitable sampling methods to determine the effects of use and reuse throughout the lakes drainage basins on the quality of waters contributing or draining into lakes Erie and Ontario. The inventory will relate to water supply, wastewater disposal, land and agricultural drainage, solid waste disposal practices and effects on water uses both active and potential. Present Commission records will be updated and where data is lacking, surveys, interviews and quality surveys will be made of water supplies, waste sources and streams to inventory the changes that are occurring in each basin and sub-basin.

2. Pollution Source Evaluation

Significant sources of pollution discharged directly into the lakes or interconnecting channels, including the St. Lawrence River, by municipalities and industries will be studied for the qualitative-quantitative characteristics of the material contributed. Studies of wastewater assimilation involving pollutant decay, dilution and dispersion will be developed to lead if possible to predictions of quality changes taking place under various conditions. Wastewater discharges from approximately 55 municipalities and 130 industries will be studied in this program. The field project will be supplemented by aerial surveillance patrols to assist in -

(a) the study program; and
(b) to supplement the surveillance work of the Commission's existing pollution control program.

3. The Harbour and Near Shore Study Program

Investigations will be undertaken in the major harbour areas of lakes Erie and Ontario to study the effects and movement of pollution in these restricted areas.

4. Tributary Streams

Sixty streams tributary to lakes Erie, Ontario, and the St. Lawrence River will be sampled on a regular bi-weekly basis. The inventory of waste sources will be supplemented by an inventory of quality changes contributed by the tributary streams.

5. Special and Deeper Water Projects

Two water borne investigation crews are to be utilized in the pollution source evaluations on lakes Erie and Ontario and the related harbour and near shore and special deeper water projects.

6. Interconnecting Channel Investigations

Water quality monitoring and surveillance surveys will be carried out on the St. Marys, St. Clair-Detroit, and Niagara rivers. Effluent dispersion studies are planned for Sault Ste. Marie, Sarnia and Windsor area industries. Thirteen municipalities and 48 industries on the interconnecting channels will be included in the investigation program. Seventeen streams discharging to the interconnecting channels will be sampled at regular intervals.

THE GREAT LAKES
DRAINAGE BASINS